

FOOD SCIENCE

Food Science is a two semester course that provides students with an overview of food science and its importance. Introduction to principles of food processing, food chemistry and physics, nutrition, food microbiology, preservation, packaging and labeling, food commodities, food regulations, issues and careers in the food science industry help students understand the role that food science plays in the securing of a safe, nutritious, and adequate food supply. A project-based approach is utilized along with laboratory, team building, and problem solving activities to enhance student learning.

Course Specifications

- DOE Code: 5102
- Recommended Grade Level: Grade 9-12
- Recommended Prerequisites: Introduction to Agriculture, Food, and Natural Resources
- Credits: 1 credit per semester, maximum of 2 credits
- Fulfills a Life Science or Physical Science requirement for the General Diploma only or counts as a Directed Elective or Elective for the General, Core 40, Core 40 with Academic Honors and Core 40 with Technical Honors diplomas

Career and Technical Student Organizations (CTSOs)

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in FFA, the CTSO for this area.

Content Standards

Domain - The History of the Food Industry.

Core Standard 1 Students evaluate the significance and implications of changes and trends in the food products and processing industry to understand current trends.

Standards

- | | |
|--------|--|
| FS-1.1 | Discuss the history and describe and explain the components (e.g., processing, distribution, byproducts) of the food products and processing industry |
| FS-1.2 | Evaluate changes and trends in the food products and processing industry |
| FS-1.3 | Identify and explain environmental and safety concerns about the food supply |
| FS-1.4 | Discuss the issues of safety and environmental concerns about foods and food processing (e.g., Genetically Modified Organisms, microorganisms, contamination, irradiation) |

Core Standard 2 Students apply concepts effectively used with industry organizations, groups and regulatory agencies affecting the food products and processing industry to understand current laws and regulations regarding our foods.

Standards

- | | |
|--------|--|
| FS-2.1 | Explain the purposes of organizations that are part of or regulate the food products and processing industry |
| FS-2.2 | Evaluate the changes in the food products and processing industry brought about |

- by industry organizations or regulatory agencies
- FS-2.3 Explain the importance and usage of industry standards in food products and processing
- FS-2.4 Discuss the application of industry standards in the food products and processing industry
- FS-2.5 Prepare a plan for implementation of industry standards in food products and processing programs

Domain - Food Safety Principles and Practices

Core Standard 3 Students create equipment and facility maintenance plans to manage operational procedures.

Standards

- FS-3.1 Explain the importance of developing and maintaining Sanitation Standard Operating Procedures (SSOP)
- FS-3.2 Evaluate the SSOP of a food products and processing company
- FS-3.3 Explain the purpose of Good Manufacturing Practices (GMP)
- FS-3.4 Evaluate the GMP of a food products and processing company
- FS-3.5 Identify reasons for using a planned maintenance program to maintain equipment and facilities
- FS-3.6 Perform basic equipment and facility maintenance in a food products and processing operation

Core Standard 4 Students implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters.

Standards

- FS-4.1 Describe contamination hazards (physical, chemical and biological) associated with food products and processing
- FS-4.2 Outline procedures to eliminate possible contamination hazards associated with food products and processing
- FS-4.3 Analyze the effectiveness of a food products and processing company's Critical Control Point (CCP) procedures
- FS-4.4 Identify the seven principles of HACCP
- FS-4.5 Explain the implementation of the seven principles of HACCP
- FS-4.6 Implement an HACCP program for a food products and processing facility

Core Standard 5 Students apply safety and sanitation procedures to understand the handling, processing and storing of food products.

Standards

- FS-5.1 Explain techniques and procedures for the safe handling of food products
- FS-5.2 Demonstrate approved food product handling techniques
- FS-5.3 Describe the importance of performing quality-assurance tests on food products
- FS-5.4 Perform quality-assurance tests on food products
- FS-5.5 Describe the effects food-borne pathogens have on food products and humans
- FS-5.6 Conduct and interpret microbiological tests for food-borne pathogens and implement corrective procedures

- FS-5.7 Explain the importance of record keeping in food products and processing systems
- FS-5.8 Discuss documentation procedures in a food products and processing system

Core Standard 6 Students evaluate food product and processing equipment and facilities to understand proper worker safety procedures.

Standards

- FS-6.1 Explain safety standards that must be observed in facility design and equipment use
- FS-6.2 Outline guidelines for personnel safety in the food products and processing industry
- FS-6.3 Evaluate a facility to determine the implementation of safety procedures

Domain - The Science of the Food Products and Processing Industry

Core Standard 7 Students apply principles of science to food processing to provide a safe, wholesome and nutritious food supply.

Standards

- FS-7.1 Discuss how research and industry developments lead to improvements in the food products and processing industry
- FS-7.2 Explain the application of chemistry and physics to food science
- FS-7.3 Explain the Food Guide Pyramid in relation to essential nutrients for the human diet
- FS-7.4 Discuss common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals)
- FS-7.5 Identify common food additives (e.g., preservatives, antioxidants, buffers, stabilizers, colors, flavors)
- FS-7.6 Explain the importance of food labeling to the consumer
- FS-7.7 Describe factors in planning and developing a new food product (e.g., regulation, creativity, and economics)

Domain - Storage, Distribution and Consumption of Food Products

Core Standard 8 Students integrate harvesting, selection and inspection techniques to obtain quality food products for processing.

Standards

- FS-8.1 Identify quality and yield grades of food products
- FS-8.2 Assign quality and yield grades to food products according to industry standards
- FS-8.3 Select raw food products based on yield grades, quality grades and related selection criteria
- FS-8.4 Perform quality-control inspections of raw food products for processing
- FS-8.5 Identify and describe accepted animal treatment and harvesting techniques
- FS-8.6 Compare and contrast accepted animal treatment and harvesting techniques
- FS-8.7 Describe the importance of pre-mortem and post-mortem inspections of animals for harvest
- FS-8.8 Explain desirable and undesirable characteristics of both premortem and post-mortem animals in relation to the production of food products

Core Standard 9 Students evaluate food products to understand how they are processed.

Standards

- FS-9.1 Identify and describe foods derived from meat, egg, poultry, fish and dairy products
- FS-9.2 Grade and classify processed meat, egg, poultry, fish and dairy products

- FS-9.3 Identify and describe products derived from fruits and vegetables
- FS-9.4 Grade and classify processed products from fruits and vegetables
- FS-9.5 Identify and describe products derived from grains, legumes and oilseeds
- FS-9.6 Grade and classify finished products derived from grains, legumes and oilseeds

Core Standard 10 Students will apply processes, preservation, packaging and food presentation to food products for sale and distribution to understand product development.

Standards

- FS-10.1 Identify and explain common weights and measures used in the food products and processing industry
- FS-10.2 Weigh and measure food products and perform conversions between units of measure
- FS-10.3 Explain methods and materials for processing foods for sale as fresh-food products
- FS-10.4 Prepare foods for sale and distribution as fresh-food products
- FS-10.5 Identify methods of food preservation and give examples of foods preserved by each method
- FS-10.6 Preserve foods using various methods and techniques
- FS-10.7 Explain techniques for preparing ready-to-eat food products
- FS-10.8 Demonstrate techniques of preparing ready-to-eat food products
- FS-10.9 Explain materials and methods of food packaging and presentation
- FS-10.10 Analyze the foods stored in various packaging materials to determine which materials retain desirable food qualities
- FS-10.11 Identify and explain storage conditions to preserve product quality
- FS-10.12 Select methods and conditions for storing raw and processed food products

Domain - Careers

Core Standard 11 Students examine the scope of career opportunities in and the importance of agriculture to the economy.

Standards

- FS-11.1 Define and explore food agriculture and food agribusiness and their role in the economy
- FS-11.2 Evaluate and explore the food science career opportunities in agriculture
- FS-11.3 Identify how key organizational structures and processes affect organizational performance and the quality of products and services
- FS-11.4 Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society

Domain - Leadership

Core Standard 12 Students validate the necessity of leadership skills development in conjunction with participation in The National FFA Organization (FFA) as a critical component to a well rounded agricultural education.

Standards

- FS-12.1 Acquire and demonstrate communication skills such as writing, public speaking, and listening while refining oral, written, and verbal skills
- FS-12.2 Recognize and explain the role of the FFA in the development of leadership,

- education, employability, communications and human relations skills
- FS-12.3 Examine roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment
- FS-12.4 Acquire the skills necessary to positively influence others
- FS-12.5 Develop a skill set to enhance the positive evolution of the whole person

Domain - Supervised Agriculture Experience

Core Standard 13 Students validate the necessity of a Supervised Agricultural Experience (SAE) program as a critical component to a well rounded agricultural education.

Standards

- FS-13.1 Explain the nature of and become familiar with those terms related to an SAE program
- FS-13.2 Explore the numerous possibilities for an SAE program which a student might develop
- FS-13.3 Develop an individual SAE program and implement record keeping skills